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ABSTRACT

A group of concerned companies in the nuclear electric power industry formed the Electric Utility Instructor Training Consortium to train instructors in a cost-effective and time-efficient manner. The companies collaborated with the Ohio State University to (1) conduct job and task analyses; (2) develop performance-based instructor modules; (3) conduct a field review of the modules; and (4) revise and publish the 18 modules. The companies, such as Virginia Power, have used this process to organize their programs to provide for effective and efficient initial instructor training, advanced training, and continuing development. The companies were pleased with the modules developed and are integrating them into their training programs. (A competency profile of an industry instructor developed by the consortium is included in this report.) (KC)

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Electric Utility Instructor Training Consortium

MANAGING INSTRUCTOR TRAINING TO ACHIEVE EXCELLENCE

Presented at

Mid-America Competency-Based Education Conference
University of Iowa

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June 13, 1989

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MANAGING INSTRUCTOR TRAINING TO ACHIEVE EXCELLENCE

by
Robert E. Norton
The Ohio State University

The requirements for instructor training in the nuclear electric power industry are clearly set forth in the August 1988 INPO 88-012, Guidelines for Instructor Training and Qualification. To be accredited and re-accredited, companies will need to address the initial and continuing instructional skills development called for. The initial training of instructors presents a special challenge since only a few new instructors will be employed by most companies over the next few years. Another challenge that must be dealt with is providing individualized remedial instruction to remove performance deficiencies identified during staff evaluations.

This presentation will explain how a group of concerned companies formed the Electric Utility Instructor Training Consortium to address this problem in a cost-effective and time-efficient manner. It will further explain how these companies collaborated with The Ohio State University to (1) conduct job and task analysis, (2) develop performance-based instructor modules, (3) conduct a field review of the modules, and (4) revise and publish the 18 modules. Further, the presentation will explain how companies like Duke Power and Virginia Power have organized their instructor training programs to provide for both effective and efficient (1) initial instructor training, (2) advanced training, and (3) continuing development. Transparencies, task lists, and other hand-out materials will be used to supplement and enhance the proposed presentation.

There is little question about the importance of preparing instructors so that they can effectively teach what they know to others. The most commonly employed criterion for the selection of instructors is their technical expertise. While technical expertise is extremely important, the quality of training is likely to be less than it should be unless these subject-matter experts also acquire the teaching skills necessary to convey their knowledge and skills to others.

Instructors who pay little attention to the needs of the adult learners involved, the learning environment, trainee motivation, and the appropriate selection of instructional techniques and evaluation activities are unlikely to produce the learning outcomes and job performance improvements being sought. Most good instructors acquire their professional expertise through some type of formalized training program.

The situation is much the same for instructors who also design instructional programs. Without adequate knowledge of the principles of effective instructional design and acquisition of the related skills involved, instructors are not likely to develop instruction that will effectively address the company's needs.

The Problem

In today's highly competitive business and industrial environment, most training managers recognize that an effective performance-based and results-oriented training program is one of the factors most critical to a company's survival and success. In the nuclear power industry, for example, the Institute of Nuclear Power Operations (INPO) has established rigorous guidelines for acquiring initial accreditation and for maintaining the accreditation of company training programs. INPO's recently issued guidelines (March 1988; INPO-88-001) on Maintaining the Accreditation of Training in the Nuclear Power Industry states as Objective 2 that "Training staff members (utility and contracted, if used) possess the knowledge, experience, and skills required to fulfill their assigned duties." Three of the nine criteria that will be used to determine whether companies are achieving the objective are as follows:

2.5 The instructional skills training program develops the necessary instructor capabilities to fulfill training program requirements.

2.8 Instructor performance is evaluated regularly.

2.9 Continuing development maintains and improves required knowledge and skills and addresses results of evaluations of staff member performance.

These guidelines make it abundantly clear that utility instructors are to be given effective initial preparation, as well as continuing instruction, that is based on regular evaluations of instructor performance.

More recently, INPO issued revised guidelines (August 1988, 88-012) in Guidelines for Instructor Training and Qualification which specify 28 areas that "should be considered for the instructional skills initial training program." While few disagree with the intent of 88-001 or 88-012, companies are often faced with some challenges as they attempt to respond to these criteria.

One difficulty arises when a company needs to provide initial performance-based training for only one or a few new instructors. The small number of persons involved often makes it very expensive and somewhat impractical to conduct a traditional instructor-led course for these persons.

A somewhat different challenge arises when the evaluations of individual instructor performance reveals that different instructors have quite different skill deficiencies, and hence, different continuing training needs. Again, an individualized or small group, performance-based training approach is required if the unique needs of different instructors are to be met.

It is widely recognized that any performance-based training program, whether for instructors or technical personnel, requires the availability of high-quality instructional materials that focus on and help deliver the specific skills and knowledge needed by the trainees. Unfortunately, performance-based materials that are self-contained and designed specifically for the professional development of instructors in the electric utility industry are still in very short supply.

Many electric utility companies have contacted the Center on Education and Training for Employment (formerly the National Center for Research in Vocational Education) to learn more about the 21-year research and development effort that resulted in the preparation of 132 PBTE (performance-based teacher education) modules that address the teaching skills needed by teachers in the public and private secondary and postsecondary schools and colleges of the United States. Over 1,800 educational agencies and over 400 companies and governmental agencies have purchased these materials.

Some electric power companies, such as Virginia Power and the Public Service Company of New Hampshire, appear to be making effective use of these modules in their current form. Other companies, however, have chosen to use the PBTE materials only as supplementary references, because some of the terminology, case studies, illustrations, and other educational features are not pertinent to industrial trainers and trainees.

What is required to meet the needs of specific companies, the INPO accreditation guidelines, and the needs of individual instructors is a set of high-quality performance-based modularized materials that address the specific training and educational needs of instructors in the electric utility industry.

Recognizing this need, several electric power companies joined with the Center in November of 1986 to organize the Electric Utility Instructor Training Consortium. In a two-phased effort the Consortium began work to accomplish three major objectives as follows:

1. To identify and verify the important tasks performed by instructors in the electric utility industry (Phase I).

2. To adapt and revise existing performance-based instructor modules specifically for use in the electric utility industry (Phase II and III).

3. To develop new performance-based instructor training modules and related support materials to meet utility instructor needs that are not addressed by an existing materials (Phase II and III).

During Phase I (November 1986 - February 1987), a comprehensive analysis of the job of electric utility instructor was conducted utilizing both a review of literature and a DACUM panel of expert instructors. This research phase of the Consortium resulted in the identification and national verification of 130 tasks as important to the job of electric utility instructor. A total of 120 expert instructors, employed at 19 different power plants by 13 companies participated in the verification effort. Phase I concluded with the publication of a job analysis report and the clustering of the 130 tasks into 20 proposed modules that were believed to be needed by all utility instructors.

For a list of the 130 verified task statements (competencies), see the Competency Profile of Industry Instructor.

To produce the performance-based modules needed, Phase II was begun in September 1987 to develop the proposed modules. Five companies (Consolidated Edison of New York, Detroit Edison, Duke Power, Florida Power, and Virginia Power) sponsored the development effort and provided resources for the development of 11 of the originally proposed 20 modules. Since the initial clustering, one module was deselected and a second was combined with another leaving a need for seven more. The development of the 11 modules was completed on December 31, 1988.

Initial reactions to the modules being developed have been extremely positive. Most reviewers have rated the modules as of very high quality and have stated that they would definitely like to use the modules in their training program. For the reactions of utility instructors and training managers to the modules, see Attachment A. For the titles of the 11 modules developed in Phase II and the titles of the additional modules now being developed, see Attachment B.

What remains to be done is to complete the Phase III development effort which began January 1, 1989. The following nine-electric power companies are supporting this developmental effort which will be completed on or before December 1989: Cleveland Electric Illuminating, Consolidated Edison of New York, Detroit Edison, Duke Power Company, Florida Power Corporation, Florida Power and Light Company, Indiana Michigan Electric, Southern California Edison, and Virginia Power. Each member company has already made plans or is currently in the process of making plans for integrating use of the materials in one or more of their training programs.

Company Plans

Some companies are planning to make major use of the modules in their initial certification training program, others plan to utilize them for advanced and/or continuing training, and all companies plan to utilize them for remediation training. Attachment C describes how the Cleveland Electric Illuminating Company plans to make extensive use of the modules in their training and certification programs. All other member companies are devising similar implementation strategies for their companies.

It is important to make note of the fact that all companies are making adequate provision for one or more resource persons (master instructors) to be available to instructor trainees. While the modules are essentially self-contained, they are not designed as self-instructional materials. A qualified resource person(s) is absolutely critical to maximizing the successful use of these or any other modularized materials.

Plans for Publication

The Center will be arranging for the commercial publication of the modules and any supportive materials that may be developed. The actual date of publication, terms of publication and sale prices are not known as of this date. Interested persons should write to Dr. Robert E. Norton at the Center on Education and Training for Employment, The Ohio State University, 1900 Kenny Road, Columbus, OH 43210.

Relationship of Modules to INPO Guidelines

We made a comparative analysis of the competencies specified for initial instructor skills training in INPO document 88-012 entitled Guidelines for Instructor Training and Qualification with those addressed by the Consortium modules.

Of the 28 areas specified by the INPO Guidelines, 24 of them are addressed by one or more of the proposed 18 modules. That computes to approximately 86% coverage. In addition, three other important competencies will also be thoroughly addressed as follows:

Module D-4 Conduct Mock-up Training
Module E-3 Determine Test Quality
Module E-4 Evaluate Instructional Effectiveness

The additional modules, like the other 18, were found to be important during the job analysis workshop and verified as important during the national task verification research study. The four areas not scheduled to be addressed at this time (4.2.1.9, 4.2.1.12, 4.2.1.23, 4.2.1.24) could very easily be addressed by the Consortium in a future scope of work, if approved by the board.

The 18 modules would also be appropriate for addressing at least 3 of the 5 areas specified for instructional skills continuing development (INPO 88-012, p. 15) as follows:

- o refresher topics from initial instructional skills training
- o new and advanced instructional techniques and methods
- o performance deficiencies identified during instructional evaluations

Summary

Using the cooperative development approach, Center staff has taken responsibility for module conceptualization, development, revision, and quality control. Appropriate staff from the member utility companies have helped by serving as technical consultants to the module writers and by providing field reviews of all the modules developed so as to assure their technical accuracy and relevance to the electric power industry.

The consortium operates through a Board of Members, comprised of one representative per member company. By joining and financially supporting the consortium, each company participates in policy making and program review meetings held approximately every six months.

A company's involvement in the consortium has resulted in a number of benefits, as follows:

1. For supporting the research and development needed, each company will be receiving 18 modules, targeted specifically for their instructor training needs.

2. By sharing development expertise, the Center and member companies have produced higher-quality materials than could be produced individually.

3. The consortium approach permitted the development of materials that could not be afforded by individual companies.

4. Use of the cooperative approach has resulted in the development of an important sense of ownership and commitment to use the materials produced.

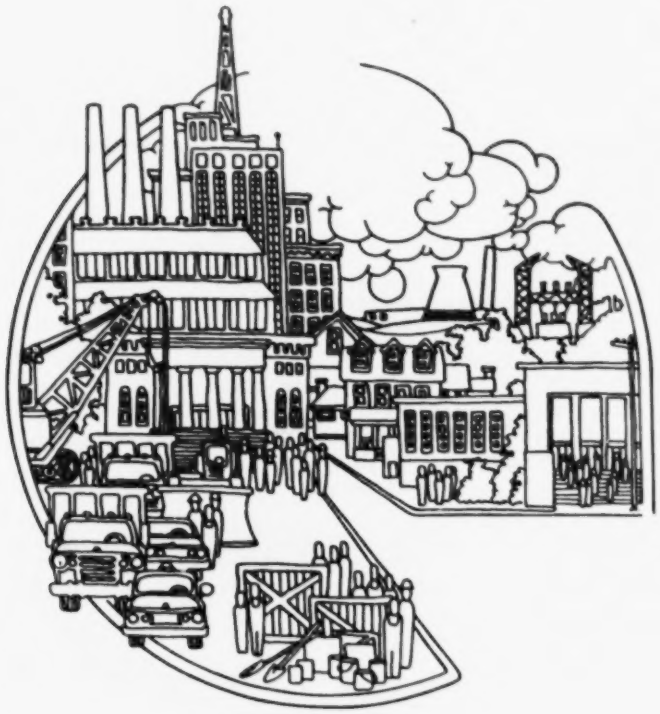
5. The involvement of company personnel provided excellent professional growth opportunities for those who participated in the research, development, and review process.

6. The availability and use of the proposed industry-specific modules will assist companies in meeting and maintaining industry training program accreditation standards.

7. Upon commercial publication, the modularized materials will be available at a reasonable price to any company who can benefit from their use.

Electric Utility Instructor Training Consortium

COMPETENCY PROFILE OF INDUSTRY INSTRUCTOR



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Industry Instructor

Duties	Tasks											
A Develop & Maintain Technical Proficiency	A-1 Perform in-plant assignments	A-2 Maintain currency with regulatory guidelines	A-3 Review industry events	A-4 Review procedure changes	A-5 Review plant modifications	A-6 Participate in technical vendor training	A-7 Participate in technical seminars/workshops	A-8 Participate in in-house technical training				
B Develop & Maintain Instructional Proficiency	B-1 Attain instructor certification	B-2 Attain simulator instructor certification	B-3 Prepare for instructor recertification	B-4 Participate in seminars and workshops	B-5 Participate in in-house continuing instructor training	B-6 Participate in peer instructional evaluation	B-7 Participate in vendor training	B-8 Maintain currency with industry instructional guidelines				
C Assess Training Needs	C-1 Conduct preassessment of trainee	C-2 Evaluate training needs of plant	C-3 Evaluate training needs of class	C-4 Evaluate training needs of instructors	C-5 Review job & task analyses data	C-6 Evaluate training implications of industry & regulatory guidelines	C-7 Conduct job analysis	C-8 Develop a job analysis survey	C-9 Conduct task analysis	C-10 Obtain job- & task-related documentation	C-11 Write training development recommendations	C-12 Evaluate need for vendor training
	C-13 Serve as subject matter expert for job & task analyses	C-14 Revise existing job analysis	C-15 Identify training resources	C-16 Identify training constraints	C-17 Analyze existing materials							
D Develop/Revise Instructional Material	D-1 Write program & course descriptions	D-2 Formulate performance objectives based on job & task analyses	D-3 Sequence performance objectives	D-4 Obtain reference materials	D-5 Select reference materials	D-6 Develop test items based on objective level	D-7 Construct lesson plans	D-8 Correlate lesson plan content with objectives	D-9 Develop job performance measures	D-10 Revise job performance measures	D-11 Develop visual & graphic aids	D-12 Develop learning activities
	D-13 Develop simulator exercise guides	D-14 Develop lab exercises	D-15 Develop text/manuals	D-16 Develop trainee handouts	D-17 Review instructional materials for format & technical accuracy	D-18 Pilot test training materials	D-19 Revise instructional materials to reflect industry, plant, & regulatory changes		D-20 Modify existing training methods	D-21 Modify existing audiovisual materials	D-22 Develop simulator team training criteria	D-23 Revise simulator team training criteria
E Prepare for Instruction	E-1 Review trainee backgrounds	E-2 Review course materials	E-3 Select methods of instruction	E-4 Personalize lesson plan	E-5 Assemble training aids/ equipment	E-6 Set up training area	E-7 Identify personnel dosimetry/safety requirements					
F Coordinate & Schedule Training	F-1 Establish training goals	F-2 Develop a training matrix	F-3 Schedule training activities	F-4 Evaluate vendor training programs	F-5 Select vendor training programs	F-6 Arrange for off-site vendor training	F-7 Arrange for off-site company training	F-8 Arrange for on-site guest instructors	F-9 Facilitate on-the-job training program	F-10 Schedule reactor operator/ senior reactor operator audit exams	F-11 Schedule training program exams	F-12 Arrange for availability of equipment & facilities
G Operate & Maintain Instructional Equipment	G-1 Inventory training aids & equipment	G-2 Inventory lab/simulator equipment	G-3 Order needed equipment	G-4 Operate lab equipment	G-5 Make minor repairs to lab equipment	G-6 Operate simulator	G-7 Identify simulator problems	G-8 Test simulator modifications	G-9 Develop test procedures for simulator	G-10 Run test procedures on simulator	G-11 Process simulator modifications	G-12 Select training equipment
H Deliver Instruction	H-1 Present formal classroom instruction	H-2 Conduct demonstrations	H-3 Conduct seminars/ workshops	H-4 Conduct simulator training	H-5 Conduct tours & walk-downs	H-6 Conduct mock-up training	H-7 Conduct on-the-job training sessions	H-8 Conduct lab exercises	H-9 Administer self-study materials			
I Supervise Trainees	I-1 Monitor lab activities	I-2 Monitor simulator activities	I-3 Tutor trainees	I-4 Conduct performance reviews	I-5 Counsel trainees	I-6 Proctor exams	I-7 Direct trainee presentations					
J Evaluate Trainees	J-1 Conduct written exams	J-2 Conduct performance tests	J-3 Conduct oral exams	J-4 Conduct formative exams	J-5 Conduct summative exams	J-6 Conduct in-course assessment of individuals	J-7 Review test results with trainees	J-8 Conduct end-of-course assessment of individuals				

Duties	Tasks				
K **Evaluate Training Effectiveness**	K-1 Perform informal oral surveys	K-2 Conduct formal follow-up surveys	K-3 Conduct course critiques	K-4 Analyze test items	K-5 Analyze exam results
	K-6 Make recommendations based on course evaluation	K-7 Evaluate vendor training performance	K-8 Conduct emergency drill critiques		
L **Perform Administrative Activities**	L-1 Track trainees' progress	L-2 Document trainee attendance	L-3 Compile & review exams	L-4 Grade exams	L-5 Maintain course records
	L-6 Prepare special reports	L-7 Respond to audits	L-8 Serve on committees	L-9 Perform audit of course materials	L-10 Prepare a budget
	L-11 Assist in procedure validation				

Worker Traits and Attitudes

Knowledgable
Enthusiastic
Student oriented
Confident
Patient
Organized
Sense of humor
Flexible/open-minded
Positive
Extrovert/outgoing
Professional
Empathy
Honest
Dedicated/committed
Self-directed

Facilitated by

Dr. Robert E. Norton, Consortium Manager, and Allen Wiant
Center on Education and Training for Employment
The Ohio State University
Columbus, Ohio 43210

Verified By:

These companies were verified by 120 expert instructors who responded to a written task inventory. The worker traits and attitudes were specified by five or more respondents and are listed in the order of most frequently to least frequently mentioned.

For information about the modules and other materials that are being developed by the Center, under sponsorship of the multi-state consortium, to address most of the competencies identified, contact the Consortium Manager.

Electric Utility Industry DACUM Committee

Robert W. Allen, Tennessee Valley Authority
Tim Black, South Carolina Electric & Gas
Richard Buck, Virginia Power
Jim Byko, Duke Power Company
Dan Drotar, Detroit Edison
James B. Heishman, Cleveland Electric
Tom Howell, South Carolina Electric & Gas
Mike Orlando, Virginia Power
Jan Salas, Duke Power Company
Eric R. Schatz, Cleveland Electric
Linda Strickland, Tennessee Valley Authority

Companies Supporting Module Development:

Cleveland Electric Illuminating
Consolidated Edison of New York
Detroit Edison
Duke Power
Florida Power
Florida Power & Light
Indiana Michigan Electric
Southern California Edison
Virginia Power

Electric Utility Instructor Training Consortium

WHAT DO ELECTRIC UTILITY INSTRUCTORS AND TRAINING MANAGERS SAY ABOUT THE MODULES?

The following statements were made by electric utility instructors and managers who provided field reviews of the modules.

- Truly excellent work. Reviewing work of this caliber is a joy!
- The whole electric utility industry needs these. The materials are beautiful!
- These modules will raise industry standards for instruction. They will save us time and provide for the consistent use of terminology.
- The case situations in this module (A-1) are excellent.
- The writer has done an excellent job in all respects (B-1). I am impressed with the completeness, clarity of explanations, and the considerations/questions during design phases. I'm already copying pages to use now.
- The section concerning adult learners is very well presented and provides a solid foundation for considering appropriate instructional techniques.
- Great format; your addressing the important things in a straightforward manner.
- These modules are effective self-study tools for individuals who teach periodically and for refresher training.
- With a few minor changes this module (D-1) is excellent. If the rest of the modules being developed are geared and focused on the electrical industry as this one is, we'll have some terrific material with which to work.
- Our review of module D-1 revealed that the content is accurate, comprehensive, and well organized.
- Found the modules very well written and informative. I found a great amount of useful information presented in a logical, easy to understand manner.
- These modules will blow some vendor materials out of the water.

Revised 6/2/89

INDUSTRY INSTRUCTOR TRAINING MODULES

Category	**A:**	**Analysis**
	A-1	Determine Training Needs
	A-2	Conduct Job and Task Analyses
Category	**B:**	**Design**
	B-1	Design Instruction
	B-2	Develop Learning Objectives
Category	**C:**	**Development**
	C-1	Develop Lesson Plans
	C-2	Provide Visual and Audiovisual Aids
Category	**D:**	**Implementation**
	D-1	Present Formal Classroom Instruction
	D-2	Conduct Demonstrations
	D-3	Conduct Lab/Shop Exercises
	D-4	Employ the Case Study Method
	D-5	Conduct Mock-up Training
	D-6	Conduct Tours and Walk-Throughs
	D-7	Conduct On-the-Job Training Sessions
	D-8	Conduct Independent Instruction
Category	**E:**	**Evaluation**
	E-1	Evaluate Trainee Performance: Knowledge
	E-2	Evaluate Trainee Performance Using JPMs
	E-3	Determine Test Quality
	E-4	Evaluate Instructional Effectiveness

These modules are being developed cooperatively by the Center on Education and Training for Employment at The Ohio State University and the Electric Utility Instructor Training Consortium. Development work began in September 1987 and is scheduled for completion in 1989. For more information, contact Robert E. Norton, Consortium Manager, at the Center on Education and Training for Employment, The Ohio State University, 1900 Kenny Road, Columbus, Ohio 43210-1090, (800-848-4815) or 614-292-4353.

Attachment C

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
PERRY NUCLEAR POWER PLANT

M E M O R A N D U M

TO: Electric Utility Instructor Training Consortium **DATE:** March 3, 1989

FROM: Laura B. Trevathan **PHONE:** (216) 259-3737 Ext. 5269

SUBJECT: Instructor Training for the Perry Nuclear Power Plant

The Electric Utility Instructor Training Consortium modules will be used as the basis for initial and continuing instructor training. The materials designated as basic instructor modules will be used as initial training for new instructors. Present instructors will review the basic modules as part of their continuing training.

Three modules are specified for certification in instructional technology. Continuing instructor training will be based on job assignments, and will be comprised of additional Consortium modules, Perry procedure training, and selected professional growth topics.

Initial training for Instructors:

B-1 Design Instruction
B-2 Develop Learning Objectives
C-1 Develop Lesson Plans
D-1 Present Formal Classroom Instruction
D-2 Conduct Demonstrations
E-1 Evaluate Training Performance: Knowledge

Completion of these modules would prepare a new instructor for the classroom instructor role and the developer role.

Initial training for Instructional Technologists:

A-1 Determine Training Needs
A-2 Conduct Job and Task Analysis
E-4 Evaluate Instructional Effectiveness

Continuing training for all instructors (need based):

C-2 Provide Print Instructional Materials
C-3 Provide Visual and Audiovisual Aids
D-3 Conduct Lab/Shop Exercises
D-4 Conduct Mock-up Training
D-5 Conduct Tours and Walk-throughs
D-6 Conduct On-the-Job Training Sessions
D-7 Conduct Independent Instruction
E-2 Evaluate Training Performance Using JPMs
E-3 Determine Test Quality

To allow use of the Consortium materials at the earliest possible date, implementation of the modules will be executed in two steps:

* Modules that are currently available will be implemented as soon as possible after receipt. Current Perry material that is redundant or inadequate will be eliminated.

* Additional Perry materials will be phased out as the remainder of the Consortium modules are released.